WHAT IS CLAIMED IS:

1. A cell search method for use in a CDMA(Code Division Multiple Access) mobile communications system comprising: a first step of identifying slot timing; a second step of identifying frame timing; and a

5   third step of identifying a scrambling code, wherein:

a correlating unit executes despread processing utilizing a P-search code in the first step of identifying slot timing;

said correlating unit executes despread processing utilizing an S-search code in the second step of identifying frame timing; and

10   said correlating unit executes despread processing utilizing a P-scrambling code in the third step of identifying a scrambling code;

said correlating unit calculating correlation values in each of said first, second and third steps.

2. A cell search method for use in a CDMA(Code Division Multiple

15   Access) mobile communications system comprising: a first step of identifying slot timing; a second step of identifying frame timing; and a third step of identifying a scrambling code, wherein:

calculation of correlation values in each of the first, second and third steps is performed by a correlating unit;

20   a plurality of slot timing candidates are detected at the first step of identifying slot timing without narrowing results of slot timing identification down to one candidate, said plurality of slot timing candidates being detected in one slot period by detecting one candidate, for which correlation power indicates a maximum value, at

25   predetermined constant time intervals;

frame timing identification is performed with respect to all slot

timing candidates in the second step of identifying frame timing based

upon the plurality of slot timing candidates, and one frame timing

candidate indicative of a maximum value is selected from among a

5   plurality of candidates for frame timing; and

correlation power with regard to the one timing candidate selected

at said second step is obtained and identification is achieved by

rendering a threshold decision at said third step of identifying a

scrambling code.

10   3.   A cell search method in which a correlating unit receiving a

baseband receive signal is provided with a code generator which

generates a P-search code in a first step of identifying slot timing, an

S-search code in a second step of identifying frame timing and a P-

scrambling code in a third step of identifying a scrambling code, said

15   correlating unit executing despread processing utilizing the P-search

code in the first step, despread processing utilizing the S-search code in

the second step and despread processing using the P-scrambling code in

the third step;

a power calculating unit, which receives a correlation-value

20   output from said correlating unit, performs a power calculation and

stores correlation power in a memory;

a detect unit searches for a maximum value of correlation powers

that have been stored in said memory in said first to third steps; and

a decision unit compares an average value of the correlation

25   powers that have been stored in said memory with the maximum value,

using a predetermined threshold coefficient, in said second and third steps;

wherein in said first step, said detect unit detects one slot timing candidate, which takes on a maximum value, over the duration of one

5   symbol, and detects a plurality of slot timing candidates with regard to a plurality of symbols; and

in said second step, frame timing identification is performed with respect to all slot timing candidates based upon the plurality of slot timing candidates, and said detect unit selects one frame timing

10   candidate indicative of a maximum value from among a plurality of candidates for frame timing.

4.   The method as defined in claim 3, wherein said correlating unit creates a correlation power profile based upon the P-search code in said first step, said correlating unit being internally provided with a plurality

15   of parallel-connected correlators which execute processing for starting operation chip by chip while each shifts a despreading position by one chip, executing despreading over the duration of one symbol and outputting the results, said processing being executing successively over one slot comprising a plurality of symbols;

20   after this processing is halted for the duration of a number of chips equivalent to the number of said plurality of correlators, processing similar to that of the preceding slot is executed again in the next slot;

said processing is executed over a predetermined plurality of slots, thereby completing despreading at a predetermined number of chip

25   positions; and

when calculation of correlation values by said correlating unit and calculation of powers by said power calculating unit end and the correlation powers are written to said memory at all timings of chip positions of the predetermined number, said detect unit starts searching

5   for a maximum value, detects one candidate, which takes on a maximum value, over the duration of one symbol, and detects a plurality of candidates with regard to a plurality of symbols.

5.   The method as defined in claim 3, wherein in said second step, said correlating unit, which obtains a correlation value based upon the S-

10   search code, has a plurality (2N) of correlators which operate upon being divided into first and second groups, the correlators in each group operating at identical timings;

the correlators of the first group perform despreading respectively by all codes of code numbers 1 to N in order, the correlators of the

15   second group perform despreading respectively by all codes of code numbers 1 to N in order, the correlators of the first group perform despreading of odd-numbered symbols and output the results and the second group of correlators perform despreading of even-numbered symbols and output the results, with despreading being executed over

20   the duration of one symbol; this processing is executed over a prescribed number of slots to thereby complete despreading, and when calculation of correlation powers by said correlating unit and said power calculating unit ends and the correlation powers are written to said memory at all timing candidates, said detect unit starts searching for a maximum value

25   of correlation power and detects one candidate that takes on a maximum

value; and

said decision unit evaluates the one candidate using an average of the power values that have been written to said memory, the maximum value and a predetermined threshold value.

5   6.   The method as defined in claim 5, wherein said decision unit causes control to advance to said third step if the maximum value exceeds (threshold value) × (average value), and causes control to return to said first step if the maximum value does not exceed (threshold value) × (average value).

10   7.   The method as defined in claim 6, wherein if a number of times said first step is restarted exceeds a number of times specified by a predetermined parameter, the cell search is judged to have failed and the cell search is terminated.

8.   The method as defined in claim 3, wherein at said third step, a

15   correlation power profile based upon the P-search code is created at the timing of the one candidate detected at said second step;

when calculation of correlation powers by said correlating unit and said power calculating unit ends and the correlation powers are written to said memory, said detect unit starts searching for a maximum

20   value and detects one candidate that takes on a maximum value; and

said decision unit evaluates the one candidate using an average of the power values that have been written to said memory, the maximum value and a predetermined threshold value.

9.   The method as defined in claim 3, wherein the cell search ends

25   normally if the maximum value exceeds (threshold value) × (average

value) and control is executed to return to said third step if the maximum value does not exceed (threshold value) $\times$ (average value).

10. The method as defined in claim 3, wherein said detect unit detects a plurality of slot timing candidates over the duration of one symbol instead of one slot timing candidate over the duration of one symbol in said first step.

11. The method as defined in claim 4, wherein said detect unit detects one slot timing candidate over the duration of a plurality of symbols instead of one slot timing candidate over the duration of one symbol in said first step.

12. The method as defined in claim 3, wherein said detect unit detects one slot timing candidate over the duration of a plurality of symbols instead of one slot timing candidate over the duration of one symbol in said first step.

13. The method as defined in claim 4, wherein said detect unit detects one slot timing candidate over the duration of a plurality of symbols instead of one slot timing candidate over the duration of one symbol in said first step.

14. An cell search apparatus comprising:

a correlating unit including:

a code generator which generates a P-search code in a first step of identifying slot timing, an S-search code in a second step of identifying frame timing and a P-scrambling code in a third step of identifying a scrambling code; and

a plurality of correlators arranged in parallel;

said correlating unit executing despread processing utilizing the P-search code in the first step, despread processing utilizing the S-search code in the second step and despread processing using the P-scrambling code in the third step;

5   a power calculating unit which calculates correlation power from the output of said correlating unit and outputs the calculated correlation power;

a memory which stores the output of said power calculating unit;

a detect unit which searches for a maximum value of correlation

10   powers that have been stored in said memory in each of the first, second and third steps;

a decision unit which compares an average value of correlation powers that have been stored in said memory with the maximum value, using a predetermined threshold coefficient, in the second and third

15   steps; and

a control unit which controls operation timing of each of the said units.

15.   The apparatus as defined in claim 14, wherein said correlating unit creates a correlation power profile based upon the P-search code in said

20   first step, a plurality of said correlators arranged in parallel in said correlating unit which respectively execute an operation for starting operation chip by chip while each shifts a despreading position by one chip, executing despreading over the duration of one symbol and outputting the results, said operation being executed successively over

25   one slot comprising a plurality of symbols, and said correlators then halt

the operation for the duration of a number of chips equivalent to the number of said plurality of correlators and subsequently execute processing similar to that of the preceding slot in the next slot;

said processing is executed over a predetermined plurality of slots,

5   thereby completing despreading at a predetermined number of chip positions, and when calculation of correlation values by said correlating unit and calculation of powers by said power calculating unit end and the correlation powers are written to said memory at all timings of chip positions of the predetermined number, said detect unit starts searching

10   for a maximum value, detects one candidate, which takes on a maximum value, over the duration of one symbol, and detects a plurality of candidates with regard to a plurality of symbols.

16.   The apparatus as defined in claim 14, wherein at said second step, a correlation power profile based upon the P-search code is created at all

15   timings of the plurality of candidates detected at said first step, said correlating unit has a plurality (2N) of correlators which operate upon being divided into first and second groups, the correlators in each group operating at identical timings;

the correlators of the first group perform despreading respectively

20   by all codes of code numbers 1 to N in order, the correlators of the second group perform despreading respectively by all codes of code numbers 1 to N in order, the correlators of the first group perform despreading of odd-numbered symbols and output the results and the second group of correlators perform despreading of even-numbered

25   symbols and output the results, with despreading being executed over

the duration of one symbol;

this processing is executed over a prescribed number of slots to thereby complete despreading; and

when calculation of correlation values by said correlating unit and

5 calculation of powers by said power calculating unit end and the correlation powers are written to said memory at all timings, said detect unit starts searching for a maximum value and detects one candidate that takes on a maximum value; and

said decision unit evaluates the candidate using an average of the

10 power values that have been written to said memory, the maximum value and a predetermined threshold value.

17. The apparatus as defined in claim 16, further comprising means for exercising control in such a manner that control shifts to the processing of said third step if the maximum value exceeds (threshold value) $\times$

15 (average value), and processing from said first step is executed if the maximum value does not exceed (threshold value) $\times$ (average value).

18. The apparatus as defined in claim 16, further comprising means for exercising control in such a manner that if a number of times said first step is restarted exceeds a number of times specified by a predetermined

20 parameter, the cell search is judged to have failed and the cell search is terminated.

19. The apparatus as defined in claim 17, further comprising means for exercising control in such a manner that if a number of times said first step is restarted exceeds a number of times specified by a predetermined

25 parameter, the cell search is judged to have failed and the cell search is

terminated.

20. The apparatus as defined in claim 14, wherein at said third step, said correlating unit creates a correlation power profile based upon the P-search code at the timing of the one candidate detected at said second

5 step;

when calculation of correlation values by said correlating unit and calculation of powers by said power calculating unit end and the correlation powers are written to said memory, said detect unit starts searching for a maximum value and detects one candidate that takes on a

10 maximum value; and

said decision unit evaluates the one candidate using an average of the power values that have been written to said memory, the maximum value and a predetermined threshold value.

21. The apparatus as defined in claim 20, further comprising means for

15 exercising control in such a manner that the cell search ends normally if the maximum value exceeds (threshold value) $\times$ (average value) and control returns to said third step if the maximum value does not exceed (threshold value) $\times$ (average value).

22. The apparatus as defined in claim 14, wherein said detect unit is

20 adapted to detect a plurality of slot timing candidates over the duration of one symbol in said first step.

23. The apparatus as defined in claim 15, wherein said detect unit is adapted to detect a plurality of slot timing candidates over the duration of one symbol in said first step.

25 24. The apparatus as defined in claim 14, wherein said detect unit is

adapted to detect one slot timing candidate over the duration of a plurality of symbols in said first step and to detect a plurality of candidates in one slot.

25. The apparatus as defined in claim 15, wherein said detect unit is adapted to detect one slot timing candidate over the duration of a plurality of symbols in said first step and to detect a plurality of candidates in one slot.

26. A mobile terminal comprising the cell search apparatus as defined in claim 14.